

U.S. DEPARTMENT OF COMMERCE  
NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY  
(formerly National Bureau of Standards-NBS)  
OFFICE OF STANDARDS SERVICES

**Commercial Standard CS21-58**

**Interchangeable Taper-Ground Joints,  
Topcocks, Stoppers, and Spherical-Ground Joints**

Commercial Standard CS21-58, Interchangeable Taper-Ground Joints, Topcocks, Stoppers, and Spherical-Ground Joints, was withdrawn by the U.S. Department of Commerce in August 1980.

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The following standards are under ASTM Committee E41 on Laboratory Apparatus and, under the direct responsibility of Subcommittee E41.01 on Apparatus.

Three ASTM standards were used to replace CS21-58 -

-E675-79, Standard Specification for Interchangeable Taper-Ground Stopcocks and Stoppers

-E676-79, Standard Specification for Interchangeable Taper-Ground Joints

-E677-79, Standard Specification for Interchangeable Spherical-Ground Joints

E911, Standard Specification for Glass Stopcocks with Polytetrafluoroethylene (PTFE) Plug.

For additional information on these standards, please contact:

ASTM Technical Committee E41 on Laboratory Apparatus  
Telephone: (610) 832-9736; Fax: (610) 832-9666

**American Society for Testing and Materials (ASTM)**  
100 Barr Harbor Drive  
West Conshohocken, Pennsylvania 19428-2959, USA  
Telephone: (610) 832-9585/-9550; Fax: (610) 832-9555  
Internet: <http://www.astm.org>

8.d.(2) of the OMB Circular that the meeting will be concerned with matters of the type described in 5 U.S.C. 552(b)(1). This determination was made pursuant to a delegation of authority from the Office of Management and Budget dated June 25, 1973, issued under the authority of Executive Order 11666 dated October 7, 1972 and continued by Executive Order 11769 dated February 21, 1974.

Dated: August 14, 1980.

Walter L. Baumann,  
Acting Advisory Committee, Management  
Officer.

[FR Doc. 80-25236 Filed 8-18-80; 8:45 am]

BILLING CODE 6820-32-M

## CIVIL AERONAUTICS BOARD

[Docket 34141]

### Application of Trans-Panama, S.A.; Hearing

Notice is hereby given pursuant to the Federal Aviation Act of 1958, as amended, that a hearing in the above-entitled proceeding is assigned to be held on October 7, 1980, at 9:30 a.m. (local time), in Room 1003, Hearing Room A, North Universal Building, 1675 Connecticut Avenue, N.W., Washington, D.C., before the undersigned administrative law judge.

Dated at Washington, D.C., August 14, 1980.

Elias C. Rodriguez,  
Administrative Law Judge.

[FR Doc. 80-25231 Filed 8-18-80; 8:45 am]

BILLING CODE 6320-61-M

## DEPARTMENT OF COMMERCE

### Maritime Administration

### National Oceanic and Atmospheric Administration

## DEPARTMENT OF THE TREASURY

### Internal Revenue Service

### Merchant Marine and Fisheries Capital Construction Funds; Applicable Rates of Interest on Nonqualified Withdrawals

Under the authority in section 607(b)(4) of the Merchant Marine Act, 1936, (46 U.S.C. 1101), as amended by section 21 of the Merchant Marine Act of 1970 (84 Stat. 1031), we hereby determine and announce that the applicable rate of interest on the amount of additional tax attributable to any nonqualified withdrawals from a capital

construction fund established under section 607 of the Act shall be 10.36 percent, with respect to nonqualified withdrawals made in the taxable year beginning in 1980.

The determination of the applicable rate of interest with respect to nonqualified withdrawals was computed according to the joint regulations issued under the Act (46 CFR Part 391. § 391.7(e)(2)(ii)) by multiplying 8 percent by the ratio which (a) the average yield on 5-year Treasury securities for the calendar year immediately preceding the beginning of such taxable year, bears to (b) the average yield on 5-year Treasury securities for the calendar year 1979. The applicable rate so determined was computed to the nearest one-hundredth of 1 percent.

Dated: August 11, 1980.

Samuel B. Nemlow,  
Assistant Secretary for Maritime Affairs.

Richard A. Frank,  
Administrator, National Oceanic and  
Atmospheric Administration.

Donald C. Lubick,  
Assistant Secretary of the Treasury.

[FR Doc. 80-24940 Filed 8-18-80; 8:45 am]

BILLING CODE 3510-15-M

## DEPARTMENT OF COMMERCE

### International Trade Administration

### Consolidated Decision on Applications for Duty-Free Entry of Scientific Articles

#### Correction

In FR Doc. 80-24104, at page 53192, in the issue of Monday, August 11, 1980, on page 53193 in the middle column, the sixth full paragraph now reading "Docket No.: 79-00062." is corrected to read "Docket No.: 80-00062."

BILLING CODE 1505-01-M

### National Bureau of Standards

### Status Report on Withdrawal of Voluntary Product Standards

AGENCY: Department of Commerce,  
National Bureau of Standards.

ACTION: Maintenance, Retention,  
Replacement, and Withdrawal of certain  
Voluntary Product Standards.

On June 19, 1980, the Department of Commerce (Department) announced in the Federal Register (45 FR 41475-6) the withdrawal, effective August 18, 1980, of 80 documents classified as Voluntary Product Standards. The withdrawal announcement was made in accordance with a revisions to the Procedures for

the Development of Voluntary Product Standards (15 CFR Part 10) which was announced in a separate notice in that same issue of the Federal Register (45 FR 41401-08) and which went into effect on June 19, 1980. The revised Procedures specify six criteria which must be met for the department to sponsor the development or maintenance of a standard. Section 10.13 of the revised Procedures provided that within the period ending August 18, 1980, interested parties could submit a request to the director of the National Bureau of Standards (NBS) to retain a particular standard or standards in accordance with those specified criteria. Several such requests have been received, and determinations have been reached on those requests as indicated below.

Based on proposals from the proponent organizations identified after the following titles, the following product standards will continue to be sponsored by the Department:

PS 1-74, Construction and Industrial Plywood; American Plywood Association  
PS 20-70, American softwood Lumber Standard; American Lumber Standards Committee

PS 56-73, Structural Glued Laminated Timber; American Institute of Timber Construction

PS 73-77, Carbonated Soft Drink Bottles; Glass Packaging Institute

Based on documented activity within a private standards-writing organization, the following standards will be retained by NBS for the stated periods of time to permit the orderly transfer of sponsorship of such standards from the Department to the identified organizations:

PS 13-69 Uncorded Slab Urethane Foam for Bedding and Furniture cushioning; American Society for Testing and Materials; 24 months

PS 15-69, Custom Contact-Molded Reinforced-Polyester Chemical-Resistant Process Equipment; Society of the Plastics Industry; 12 months

PS 17-69, Polyethylene-sheeting (construction, Industrial, and Agricultural Applications); Society of the Plastics Industry; 12 months

PS 23-70, Horticultural Grade Perlite; the Perlite Institute; 12 months

PS 24-70, Melamine Dinnerware (Alpha-Cellulose Filled) for Household Use; Society of the Plastics Industry; 12 months

PS 25-70, Heavy-Duty Alpha-Cellulose-Filled Melamine Tableware; Society of the Plastics Industry; 12 months

PS 27-70, Mosaic-Parquet Hardwood Slat Flooring; American Parquet Association; 6 months

PS 29-70, Plastic Heat-Shrinkable Film; Society of the Plastics Industry; 12 months

PS 30-70, School Chalk; the Crayon, Water Color and Craft Institute, Inc.; 18 months

PS 31-70, Polystyrene Plastic Sheet; Society of the Plastics Industry; 12 months

PS 34-70, Fluorinated Ethylene-Propylene (FEP) Plastic Lined Steel Pipe and Fittings; Society of the Plastics Industry; 12 months

PS 36-70, Body Measurements for the Sizing of Boys' Apparel; Mail Order Association of America; 24 months

PS 42-70, Body Measurements for the Sizing of Women's Patterns and Apparel; Mail Order Association of America; 24 months

PS 45-71, Body Measurements for the Sizing of Apparel for Young Men (Students); Mail Order Association of America; 24 months

PS 46-71, Flame-Resistant Paper and Paperboard; American Society for Testing and Materials; 18 months

PS 51-71, Hardwood and Decorative Plywood; Hardwood Plywood Manufacturers Association; 24 months

PS 52-71, Polytetrafluoroethylene (PTFE) Plastic; Society of the Plastics Industry; 12 months

PS 53-72, Glass-Fiber Reinforced Polyester Structural Plastic Panels; Society of the Plastics Industry; 12 months

PS 54-72, Body Measurements for the Sizing of Girls' Apparel; Mail Order Association of America; 24 months

PS 57-73, Cellulosic Fiber Insulation Board; American Hardboard Association; 6 months

PS 58-73, Basic Hardboard; American Hardboard Association; 6 months

PS 59-73, Prefinished Hardboard Paneling; American Hardboard Association; 6 months

PS 60-73, Hardboard Siding; American Hardboard Association; 6 months

PS 62-74, Grading of Diamond Powder in Sub-Sieve Sizes; Industrial Diamond Association of America; 12 months

PS 63-75, Latex Foam Mattresses for Hospitals; American Society for Testing and Materials; 24 months

PS 64-75, School Paste; the Crayon, Water Color and Craft Institute, Inc.; 18 months

PS 65-75, Paints and Inks for Art Education in Schools; The Crayon, Water Color and Craft Institute, Inc.; 18 months

PS 67-76, Marking of Gold Filled and Rolled Gold Plate Articles Other Than Watchcases; Jewelers Vigilance Committee; 36 months

PS 68-76, Marking of Articles Made of Silver in Combination with Gold; Jewelers Vigilance Committee; 36 months

PS 69-76, Marking of Articles Made Wholly or in Part of Platinum; Jewelers Vigilance Committee; 36 months

PS 70-76, Marking of Articles Made of Karat Gold; Jewelers Vigilance Committee; 36 months

PS 71-76, Marking of Jewelry and Novelties of Silver; Jewelers Vigilance Committee; 36 months

CS 98-62, Artists' Oil Paints; Artists Equity Association, Inc.; 18 months

CS 130-60, Color Materials for Art Education in Schools; The Crayon, Water Color and Craft Institute, Inc.; 18 months

CS 138-55, Insect Wire Screening; Insect Screening Weavers Association; 12 months

CS 151-50, Body Measurements for the Sizing of Apparel for Infants, Babies, Toddlers and Children (for the Knit Underwear Industry); Mail Order Association of America; 24 months

CS 192-53, General Purpose Vinyl Plastic Film; Society of the Plastics Industry; 12 months

CS 201-55, Rigid Polyvinyl Chloride Sheets; Society of the Plastics Industry; 12 months

CS 227-59, Polyethylene Film; Society of the Plastics Industry; 12 months

CS 245-62, Vinyl-Metal Laminates; Society of the Plastics Industry; 12 months

CS 257-63, TFE-Fluorocarbon (Polytetrafluoroethylene) Resin Molded Basic Shapes; Society of the Plastics Industry; 12 months

CS 266-65, Hide Trim Pattern for Domestic Cattlehides; National Hide Association; 12 months

CS 274-66, TFE-Fluorocarbon (Polytetrafluoroethylene) Resin Sintered Thin Coatings for Dry Film Lubrication; Society of the Plastics Industry; 12 months

R 2-62, Bedding Products and Components; National Association of Bedding Manufacturers; 12 months

R 192-63, Crayons and Related Art Materials for School Use (Types, Sizes, Packages, and Colors); the Crayon, Water Color and Craft Institute, Inc.; 18 months

The following standards have been replaced by standards published by private standards-writing organizations and, therefore, Department of Commerce sponsorship is no longer needed for them:

PS 26-70, Rigid Poly (Vinyl Chloride) (PVC) Profile Extrusions replaced by ASTM D 3678-78, Specification for Rigid Poly (Vinyl Chloride) (PVC) Profile Extrusions

PS 43-71, Fluorinated Ethylene-Propylene (FEP) Plastic Tubing replaced by ASTM D 3296-74, Specification for FEP-Fluorocarbon Resin Tubing

PS 47-71, Heat-Shrinkable Fluorocarbon Plastic Tubing replaced by ASTM D 2902-75, Specification for Fluorocarbon Resin Heat-Shrinkable Tubing

PS 55-72, Rigid Poly (Vinyl Chloride) (PVC) Plastic Siding replaced by ASTM D 3679-79, Specification for Rigid Poly (Vinyl Chloride) (PVC) Siding

CS 11-63, Moisture Regain of Cotton Yarns replaced by ASTM D 1909-77 Standard Table of Commercial Moisture Regains for Textile Fibers and ASTM D 2494-74 Standard Method of Test for Commercial Weight of a Shipment of Yarn or Man-Made Staple Fiber

CS 21-61, Interchangeable Taper-Ground Joints, Stopcocks, Stoppers, and Spherical-Ground Joints replaced by ASTM E 675-79 Standard Specification for Interchangeable Stopcocks and Stoppers, ASTM E 678-79 Standard Specification for Interchangeable Taper-Ground Joints, and ASTM E 677-79 Standard Specification for Interchangeable Spherical-Ground Joints

CS 75-56, Automatic Mechanical-Draft Oil Burners Designed for Domestic Installations replaced by ANSI Z 91.2-1976 Performance Requirements for Automatic Pressure Atomizing Oil Burners of the Mechanical-Draft Type

CS 191-53, Flammability of Clothing Textiles replaced by ASTM D 1230-61 (1972) Test for Flammability of Clothing Textiles

CS 202-56, Industrial Lifts and Hinged Loading Ramps replaced by ANSI MH14.1-1978 Industrial Loading Dockboards (Ramps)

CS 209-57, Vinyl Chloride Plastics Garden Hose replaced by ASTM D 3901-80 Standard Consumer Product Specification for Garden Hose

CS 236-66, Mat-Formed Wood Particleboard replaced by ANSI A 206.1-1979 Mat-Formed Particleboard

In the absence of any request for retention or maintenance, the following standards will be withdrawn, as previously announced, on August 18, 1980:

PS 4-66, Standard Stock Light-Duty 1-3/8-and 1-3/4-inch Thick Flush-type Interior Steel Doors and Frames

PS 6-66, Trim for Water-Closet Bowls, Tanks and Urinals (Dimensional Standards)

PS 28-70, Glass Stopcocks with Polytetrafluoroethylene (PTFE) Plugs

PS 38-70, Steel Bi-fold Closet Door Units, Frames, and Trim

PS 40-70, Package Quantities of Green Olives

PS 41-70, Package Quantities of Instant Mashed Potatoes

PS 44-71, Paper Ice Bag Sizes

PS 48-71, Package Quantities of Cubed, Sized, Crushed, and Block Ice

PS 49-71, Portable Picnic Coolers

PS 50-71, Package Quantities of Toothpaste

CS 5-65, Pipe Nipples; Brass, Copper, Steel, and Wrought Iron

CS 46-65, Hosiery Lengths and Sizes Excluding Women's

CS 234-61, Measurements for Stretch Socks and Anklets

CS 242-62, Standard Stock Commercial 1-3/4-Inch Thick Steel Doors and Frames

CS 269-65, Aluminum Alloy Chain Link Fencing

R 46-55, Tissue Wrapping Paper

R 222-46, Hot-Rolled Carbon Steel Bars and Bar-Size Shapes

R 264-61, Standard Sizes of Oil-Hardenable Flat, Ground Tool Steel Stock

In accordance with section 10.1(e) of the revised Procedures for the Development of Voluntary Product Standards and by agreement with the Consumer Product Safety Commission, the Department will retain sponsorship of the following two Product Standards until such time as arrangements for their sponsorship by a private standards-writing organization can be made:

PS 66-75, Safety Requirements for Home Playground Equipment

PS 72-76, Toy Safety

For further information contact: James E. French, Office of Engineering Standards, National Bureau of Standards, Washington, D.C. 20234. Telephone: (301) 921-3272.

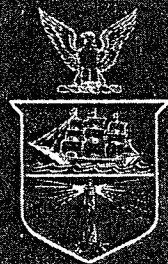
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# **WITHDRAWN**

**COMMERCIAL STANDARD CS21-58**

**Interchangeable Taper-Ground Joints,  
Stopcocks, Stoppers, and Spherical-  
Ground Joints**

**A recorded  
voluntary standard of the  
trade published by  
the U. S. Department  
of Commerce**



**For sale by the Superintendent of Documents  
U. S. Government Printing Office, Washington 25, D. C. Price 15 cents**



A M E N D M E N T No. 1

COMMERCIAL STANDARD CS21-58

INTERCHANGEABLE TAPER-GROUND JOINTS, STOPCOCKS,  
STOPPERS, AND SPHERICAL-GROUND JOINTS

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Effective October 1, 1961

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This amendment forms part of Commercial Standard CS21-58.  
All copies of the standard should include the following changes:

Page 21, Par. 11.1. Delete present wording and substitute:

11.1 Socket Member. - The design of the socket member is shown in figure 19. The contour of the ground area shall be spherical, with a minimum radius of curvature equal to one-half of the maximum gaging ball diameter specified in table 19. Contour of the shoulder shall be essentially spherical and concentric with the ground area. When tested in accordance with paragraph 11.6.2, socket members shall show a continuous circumferential line of contact with the gaging ball.

Page 22, Par. 11.2 Delete present wording and substitute:

11.2 Ball Member. - The design of the ball member is shown in figure 19. The contour of the ground area shall be spherical, with a maximum radius of curvature equal to one-half of the minimum gaging ball diameter specified in table 19. The contour of the shoulder shall be essentially spherical, approximately concentric with the ground area and with a slightly smaller radius to provide a short offset at or slightly beyond the line of the gaging diameter. Ball members shall meet the reduced pressure test (par. 11.6.3) when assembled with a socket member complying with paragraph 11.1.

COMMODITY STANDARDS DIVISION  
OFFICE OF TECHNICAL SERVICES  
U. S. DEPARTMENT OF COMMERCE

**U.S. DEPARTMENT OF COMMERCE**

**SINCLAIR WEEKS, Secretary**

**Issued by**

**OFFICE OF TECHNICAL SERVICES**

**Commodity Standards Division**

**With the cooperation of**

**NATIONAL BUREAU OF STANDARDS**

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**COMMERCIAL STANDARDS**

Commercial Standards are developed by manufacturers, distributors, and users in cooperation with the Commodity Standards Division of the Office of Technical Services, and with the National Bureau of Standards. Their purpose is to establish quality criteria, standard methods of test, rating, certification, and labeling of manufactured commodities, and to provide uniform bases for fair competition.

The adoption and use of a Commercial Standard is voluntary. However, when reference to a commercial standard is made in contracts, labels, invoices, or advertising literature, the provisions of the standard are enforceable through usual legal channels as a part of the sales contract.

Commercial Standards originate with the proponent industry. The sponsors may be manufacturers, distributors, or users of the specific product. One of these three elements of industry submits to the Commodity Standards Division the necessary data to be used as the basis for developing a standard of practice. The division, by means of assembled conferences or letter referenda, or both, assists the sponsor group in arriving at a tentative standard of practice and thereafter refers it to the other elements of the same industry for approval or for constructive criticism that will be helpful in making any necessary adjustments. The regular procedure of the division assures continuous servicing of each Commercial Standard through review and revision, whenever, in the opinion of the industry, changing conditions warrant such action.

**SIMPLIFIED PRACTICE RECOMMENDATIONS**

Under a similar procedure the Commodity Standards Division cooperates with industries in the establishment of Simplified Practice Recommendations. Their purpose is to eliminate avoidable waste through the establishment of standards of practice for sizes, dimensions, varieties, or other characteristics of specific products; to simplify packaging practices; and to establish simplified methods of performing specific tasks.

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# **Interchangeable Taper-Ground Joints, Stopcocks, Stoppers, and Spherical- Ground Joints**

**(Fifth Edition)**

[Effective July 1, 1958]

## **1. PURPOSE**

1.1 The purpose of this Commercial Standard is to provide standard dimensional requirements for obtaining, within practical limits, interchangeability in taper-ground joints, stopcocks, stoppers, and spherical-ground joints for ordinary laboratory and industrial work. It covers dimensional interchangeability of the ground surfaces only and does not involve design characteristics of the item except where specified, nor does it involve physical or chemical characteristics of the material used. The most commonly used material is glass, but joints, stopcocks, and stoppers may be made of other suitable materials as specified.

## **2. SCOPE**

2.1 This standard covers designations, dimensions, and tolerances for:

(1) Interchangeable taper-ground joints for laboratory and industrial equipment in full-length grindings, medium-length grindings, and short-length grindings;

(2) interchangeable single straight-bore, single oblique-bore, double oblique-bore (so-called 3-way), T-bore, and 120° bore stopcocks;

(3) interchangeable taper-ground stoppers for flasks, cylinders, separatory funnels, and similar articles;

(4) interchangeable taper-ground stoppers for reagent bottles;

(5) interchangeable spherical-ground joints.



### 3. GENERAL REQUIREMENTS FOR TAPER-GROUND GAGES

#### 3.1 MASTER GAGES.

3.1.1 *Material, taper, and reference lines.*—All master gages shall be made of tool steel or other suitable material, and have a minimum surface hardness of Rockwell C62. Taper of plug and ring gages shall be  $1 \pm 0.0006$  mm of diameter per centimeter of length. Location of reference lines shall be determined from center to center of the lines. Lines shall be approximately 0.1 mm (0.075 to 0.150 mm) wide.

3.1.2 *General design.*—The general design of plug and ring gages shall conform, as nearly as practicable, to the American Gage Design Standard as adopted by the American Gage Design Committee and set forth in the latest edition of Commercial Standard CS8, Gage Blanks.

The ends of plug and ring gages shall be perpendicular to the axis within  $\pm 0.5^\circ$ .

3.1.3 *Fit of mating gages.*—When a ring is fitted handtight on its mating plug, the corresponding gaging points shall not be apart more than 0.06 mm.

Finish of ground surfaces shall be such, and taper shall match sufficiently, that 75 percent of the ground surface of the ring shall show contact with its mating plug when wrung together with a light coating of Prussian blue in oil.

3.1.4 *Certification.*—All master gages shall be certified by the National Bureau of Standards at the standard temperature of  $68^\circ$  F. ( $20^\circ$  C.).

3.2 WORKING GAGES.—All commercial standard interchangeable taper-ground joints, stopcocks, and stoppers shall be made from working tools and gages that have been checked with master gages certified by the National Bureau of Standards.

### 4. REQUIREMENTS FOR TAPER-GROUND JOINTS

4.1 The designations and dimensions for full-length, medium-length, and short-length joints are shown in figure 1 and tables 1a, 1b, and 1c.

4.2 TAPER.—All taper-ground joints shall have a taper of  $1 \pm 0.006$  mm of diameter per centimeter of length (1 to 10).

4.3 MASTER GAGES.—Dimensions and tolerances for master gages are shown in figures 2 and 3, and tables 2 and 3. Overall diameter of ring gage shall be approximately twice the diameter of the small end of the bore, but not less than 25 mm.

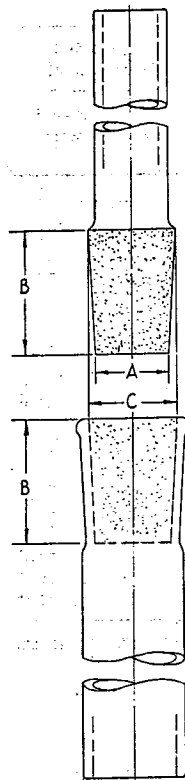


Figure 1.--Taper-ground joint.

Table 1a.--Full-length taper-ground joints

Joint size designation	Approximate diameter at small end e	Approximate length of ground zone B	Computed diameter at large end of ground zone <sup>1</sup> (gaging point) C
	mm	mm	mm
7/25.....	5.0	25	7.5
10/30.....	7.0	30	10.0
12/30.....	9.5	30	12.5
14/35.....	11.0	35	14.5
19/38.....	15.0	38	18.8
	/		
24/40.....	20.0	40	24.0
29/42.....	25.0	42	29.2
34/45.....	30.0	45	34.5
40/50.....	35.0	50	40.0
45/50.....	40.0	50	45.0
50/50.....	45.0	50	50.0
55/50.....	50.0	50	55.0
60/50.....	55.0	50	60.0
71/60.....	65.0	60	71.0
103/60.....	97.0	60	103.0

<sup>1</sup> A plus tolerance of 0.15 mm is allowed on inner members, and minus tolerance of 0.15 mm on outer members.

Table 1b.--Medium-length taper-ground joints

Joint size designation	Approximate diameter at small end A	Approximate length of ground zone B	Computed diameter at large end of ground zone <sup>1</sup> (gaging point) C
	mm	mm	mm
5/12.....	3.8	12	5.0
7/15.....	6.0	15	7.5
10/18.....	8.2	18	10.0
12/18.....	10.7	18	12.5
14/20.....	12.5	20	14.5
19/22.....	16.6	22	18.8
24/25.....	21.5	25	24.0
29/26.....	26.6	26	29.2
34/28.....	31.7	28	34.5
40/35.....	36.5	35	40.0

<sup>1</sup> A plus tolerance of 0.15 mm is allowed on inner members, and a minus tolerance of 0.15 mm on outer members.

Table 1c.—Short-length taper-ground joints

Joint size designation	Approximate diameter at small end A	Approximate length of ground zone B	Computed diameter at large end of ground zone <sup>1</sup> (gaging point) C
	mm	mm	mm
5/8.....	4.2	8	5.0
7/10.....	6.5	10	7.5
10/7.....	9.3	7	10.0
10/10.....	9.0	10	10.0
12/10.....	11.5	10	12.5
14/10.....	13.5	10	14.5
19/10.....	17.8	10	18.8
24/12.....	22.8	12	24.0
29/12.....	28.0	12	29.2
34/12.....	33.3	12	34.5
40/12.....	38.8	12	40.0
45/12.....	43.8	12	45.0
50/12.....	48.8	12	50.0
55/12.....	53.8	12	55.0
60/12.....	58.8	12	60.0
71/15.....	69.5	15	71.0

<sup>1</sup>A plus tolerance of 0.15 mm is allowed on inner members, and a minus tolerance of 0.15 mm on outer members.

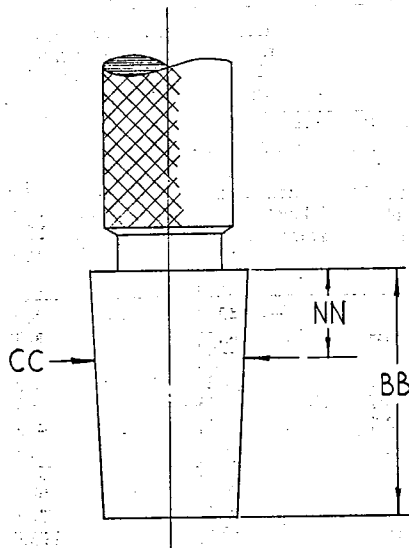


Figure 2.—Master plug gage for taper-ground joints.

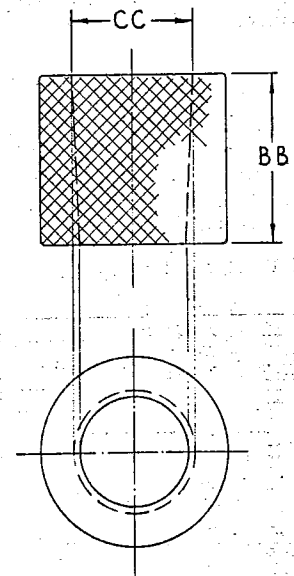


Figure 3.—Master ring gage for taper-ground joints.

Table 2.--Master plug gages for taper-ground joints

Joint size designation	Length of tapered portion, $\pm 2.0, -0$ mm BB	Diameter at gaging point, $\pm 0.003$ mm CC	Distance from top of tapered portion to gaging point NN
	mm	mm	mm
5/8, 5/12.....	24	5.0	10
7/10, 7/15, 7/25.....	37	7.5	10
10/7, 10/10, 10/18, 10/30.....	42	10.0	10
12/10, 12/18, 12/30.....	42	12.5	10
14/10, 14/20, 14/35.....	47	14.5	10
19/10, 19/22, 19/38.....	50	18.8	10
24/12, 24/25, 24/40.....	52	24.0	10
29/12, 29/26, 29/42.....	54	29.2	10
34/12, 34/28, 34/45.....	57	34.5	10
40/12, 40/35, 40/50.....	62	40.0	10
45/12, 45/50.....	62	45.0	10
50/12, 50/50.....	62	50.0	10
55/12, 55/50.....	62	55.0	10
60/12, 60/50.....	62	60.0	10
71/15, 71/60.....	72	71.0	10
103/60.....	72	103.0	10

Table 3.--Master ring gages for taper-ground joints

Joint size designation	Length of ring, $\pm 0.1$ mm BB	Inside diameter at large end of taper, $\pm 0.003$ mm CC
	mm	mm
5/8, 5/12.....	12	5.0
7/10, 7/15, 7/25.....	25	7.5
10/7, 10/10, 10/18, 10/30.....	30	10.0
12/10, 12/18, 12/30.....	30	12.5
14/10, 14/20, 14/35.....	35	14.5
19/10, 19/22, 19/38.....	38	18.8
24/12, 24/25, 24/40.....	40	24.0
29/12, 29/26, 29/42.....	42	29.2
34/12, 34/28, 34/45.....	45	34.5
40/12, 40/35, 40/50.....	50	40.0
45/12, 45/50.....	50	45.0
50/12, 50/50.....	50	50.0
55/12, 55/50.....	50	55.0
60/12, 60/50.....	50	60.0
71/15, 71/60.....	60	71.0
103/60.....	60	103.0

4.3.1 *Fit of product in working gages.*—The gaging point of the inner member shall not be below the top of the ring gage and may extend 1.5 mm above the top. The gaging point of the outer member shall not be above the gaging point of the plug gage and may be as much as 1.5 mm below the gaging point of the plug gage.

## 5. REQUIREMENTS FOR SINGLE STRAIGHT-BORE TAPER-GROUND STOPCOCKS

5.1 The designations and dimensions for single straight-bore stopcocks are shown in figure 4 and table 4.

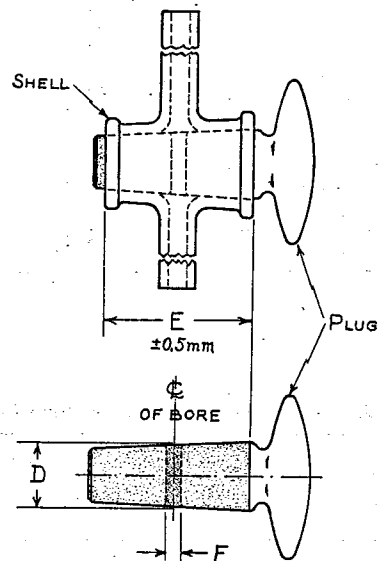


Figure 4.—Stopcock.

Table 4.—Single straight-bore stopcocks

Stopcock designation	Diameter of plug at center-line of bore D	Length of shell, ±0.5 mm E	Diameter of bore hole in plug F
	mm	mm	mm
1-M <sup>1</sup> .....	7	20	1
1.....	12	30	1
1½.....	12	30	1½
2.....	12	30	2
3.....	17	40	3
4.....	17	40	4
5.....	20	44	5
6.....	20	44	6
8.....	25	52	8
10.....	35	56	10

<sup>1</sup> Micro size.

5.2 TAPER.—All straight-bore stopcocks shall have a taper of  $1 \pm 0.006$  mm of diameter per centimeter of length (1 to 10).

5.3 MASTER GAGES.—Dimensions and tolerances for master gages are shown in figures 5 and 6, and tables 5 and 6. Overall diameter of ring gage shall be approximately twice the diameter of the bore at the reference line in the window, but not less than 25 mm.

5.3.1 *Plug gage.*—Plug shall have two short axial lines  $180^\circ$  ( $\pm 0.5^\circ$ ) apart intersecting the reference line for checking location of bore hole.

In addition to the two axial lines  $180^\circ$  apart intersecting the reference line on the 4 and 6 mm plugs, two additional axial lines shall be provided on each of these plugs for checking the location of the bore hole of T-bore and  $120^\circ$  bore stopcocks. These two additional axial lines shall be placed  $90^\circ$  and  $120^\circ$  ( $\pm 0.5^\circ$ ) from one of the first two axial lines.

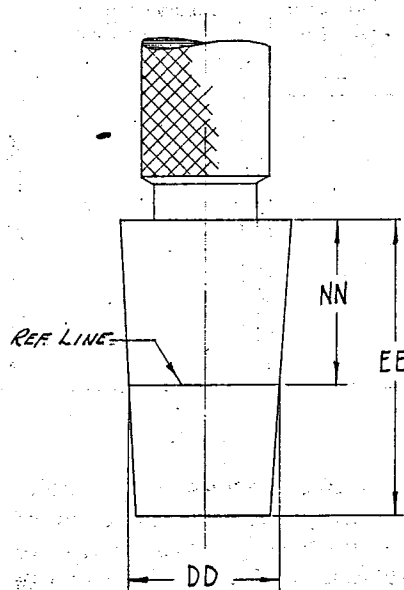


Figure 5.—Master plug gage for single straight-bore stopcocks.

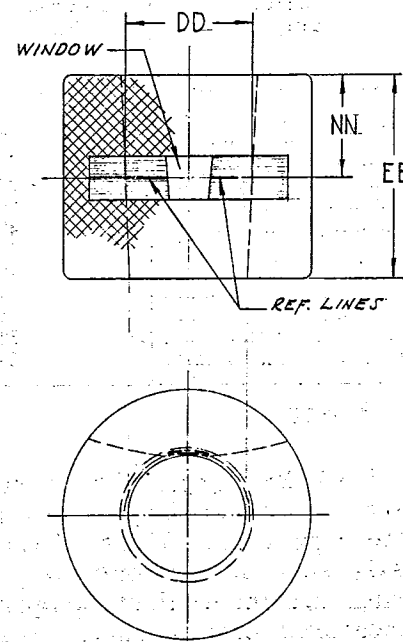


Figure 6.—Master ring gage for single straight-bore stopcocks.

Table 5.--Master plug gages for single straight-bore stopcocks

Stopcock designation	Length of tapered portion, +2.0 mm, -0 mm EE	Diameter at gaging point, $\pm 0.003$ mm DD	Distance from large end of tapered portion to gaging point NN
1-M <sup>1</sup> .....	mm	mm	mm
1.....	32	7	20
1½.....	42	12	25
2.....	42	12	25
3.....	42	12	25
.....	52	17	30
4.....	.....	.....	.....
5.....	52	17	30
6.....	56	20	32
8.....	56	20	32
10.....	64	25	36
.....	68	35	38

<sup>1</sup> Micro size.

Table 6.--Master ring gages for single straight-bore stopcocks

Stopcock designation	Length of ring, +0.2 mm, -0 mm EE	Inside diameter at gaging point, $\pm 0.003$ mm DD	Distance from top to gaging point NN
1-M <sup>1</sup> .....	mm	mm	mm
1.....	20	7	10
1½.....	30	12	15
2.....	30	12	15
3.....	30	12	15
.....	40	17	20
4.....	.....	.....	.....
5.....	40	17	20
6.....	44	20	22
8.....	44	20	22
10.....	52	25	26
.....	56	35	28

<sup>1</sup> Micro size.

5.3.2 *Ring gage.*—The central milled recess, or window, shall be placed approximately midway between the ends of the ring gage. Width of recess measured parallel with the axis shall be approximately one-fourth of the length of the ring, and the width of the opening at the inner surface of ring, measured perpendicular to the axis, shall not exceed one-fourth of the length of the ring. Reference line in recess shall be placed approximately midway between ends of ring gage.

5.3.3 *Fit of product in working gages.*—The product (both inner and outer members) shall fit the corresponding working gages so that the centerline through the bore corresponds

with the reference line on the gage within 0.3 mm for 1, 1½, and 2 mm bores, ±0.5 mm for 3 and 4 mm bores, and 1.0 for 5 mm and larger bores.

## 6. REQUIREMENTS FOR SINGLE OBLIQUE-BORE STOPCOCKS

6.1 Design, dimensions, and tolerances for 1, 1½, 2, 3, and 4 mm oblique-bore stopcocks are shown in figure 7 and table 7.

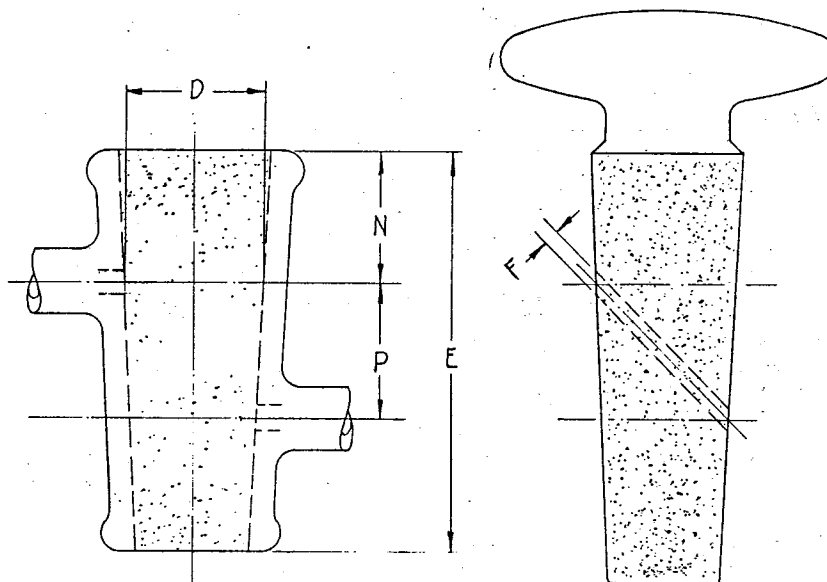


Figure 7.—Single oblique-bore stopcock.

Table 7.—Single oblique-bore stopcocks

Stopcock designation	Diameter of plug at gaging point D	Length of shell, ±0.5 mm E	Diameter of bore in plug F	Distance from large end of shell to gaging point, ±0.5 mm N	Distance between bore holes P <sup>1</sup>
1.....	mm 12.60	mm 40	mm 1	mm 14.0	mm 12
1½.....	12.60	40	1½	14.0	12
2.....	12.60	40	2	14.0	12
3.....	17.35	50	3	16.5	17
4.....	17.35	50	4	16.5	17

<sup>1</sup> See par. 6.3.3.



6.2 TAPER.--All single oblique-bore stopcocks shall have a taper of  $1 \pm 0.006$  mm of diameter per centimeter of length (1 to 10).

6.3 MASTER GAGES.--Dimensions and tolerances for master gages are shown in figures 8 and 9 and tables 8 and 9. Overall diameter of ring gage shall be approximately twice the diameter at the bore at its midpoint, but not less than 25 mm.

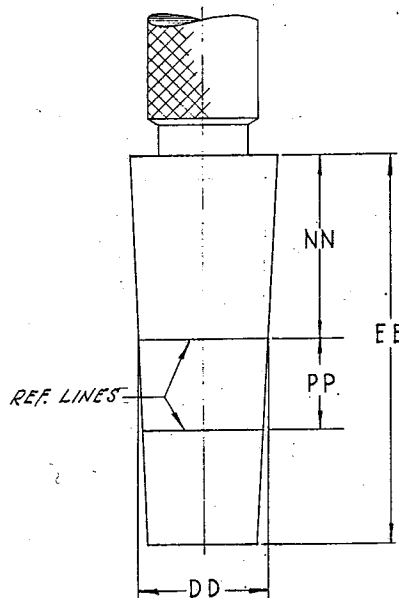


Figure 8.--Master plug gage for single oblique-bore stopcocks.

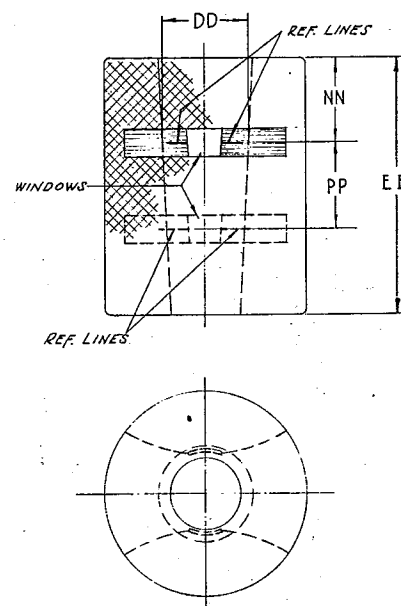


Figure 9.--Master ring gage for single oblique-bore stopcocks.

Table 8.--Master plug gages for single oblique-bore stopcocks

Stopcock designation	Length of tapered portion, +2.0 mm, -0 mm EE	Diameter at gaging point, $\pm 0.003$ mm DD	Distance from large end of tapered portion to gaging point +1.5 mm, -0 mm NN	Distance from gaging point to lower reference line $\pm 0.03$ mm PP
1.....	mm 52	mm 12.60	mm 24.5	mm 22.12
1½.....	52	12.60	24.5	22.12
2.....	52	12.60	24.5	22.12
3.....	62	17.35	27.0	22.12
4.....	62	17.35	27.0	22.12

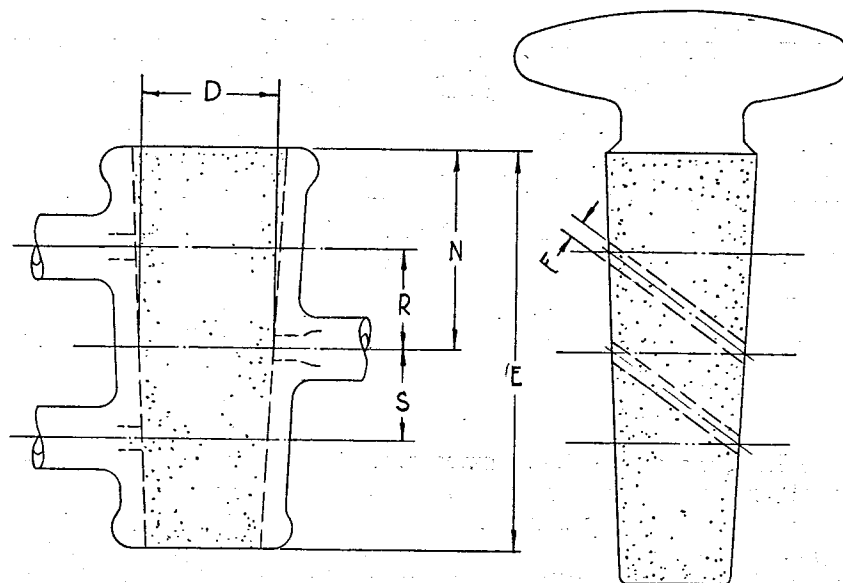


Figure 10.--Double oblique-bore stopcock.

Table 10.--Double oblique-bore stopcocks

Stopcock designation	Diameter of plug of gaging point D	Length of shell, $\pm 0.5$ mm E	Diameter of bore in plug F	Distance from large end of shell to gaging point, $\pm 0.5$ mm N	Distance from gaging point to centerline of bore near large end R <sup>1</sup>	Distance from gaging point to centerline of bore near small end S <sup>1</sup>
1.....	mm 14.5	mm 50	mm 1	mm 25	mm 12.5	mm 11.5
1½.....	14.5	50	1½	25	12.5	11.5
2.....	14.5	50	2	25	12.5	11.5
3.....	16.2	56	3	28	14.0	12.9
4.....	16.2	56	4	28	14.0	12.9

<sup>1</sup> See par. 6.3.3.

7.3 MASTER GAGES.--Dimensions and tolerances for master gages are shown in figures 11 and 12, and tables 11 and 12. The overall diameter of the ring gage shall be approximately twice the diameter of the bore at the reference line in the central window.

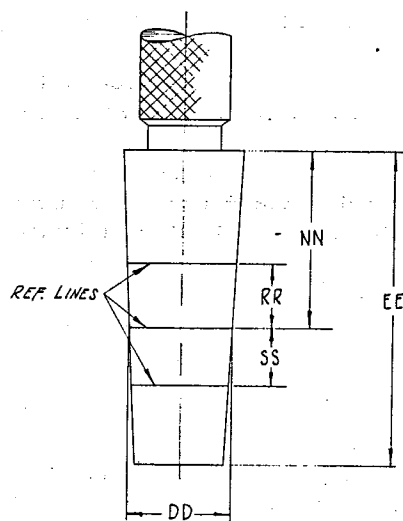


Figure 11.—Master plug gage for double oblique-bore stopcock (3-way).

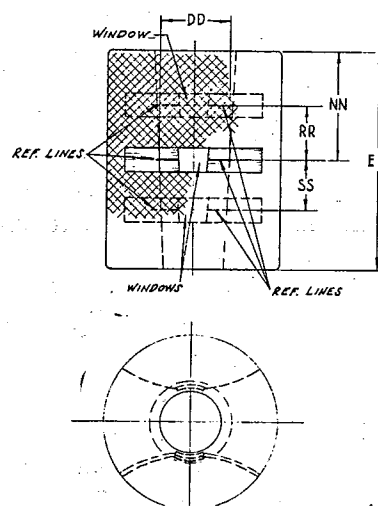


Figure 12.—Master ring gage for double oblique-bore stopcock (3-way).

Table 11.—Master plug gages for double oblique-bore stopcocks (3-way)

Stopcock designation	Length of tapered portion, +2.0 mm, -0 mm EE	Diameter at gaging point, $\pm 0.003$ mm DD	Distance from large end of tapered portion to gaging point NN	Distance from gaging point to upper reference line, $\pm 0.03$ mm RR	Distance from gaging point to lower reference line, $\pm 0.03$ mm SS
1.....	mm 62	mm 14.5	mm 35	mm 12.5	mm 11.5
1½.....	62	14.5	35	12.5	11.5
2.....	62	14.5	35	12.5	11.5
3.....	68	16.2	38	14.0	12.9
4.....	68	16.2	38	14.0	12.9

Table 12.—Master ring gages for double oblique-bore stopcocks (3-way)

Stopcock designation	Length of ring, +0.2 mm, -0 mm EE	Inside diameter at gaging point, $\pm 0.003$ mm DD	Distance from top to gaging point NN	Distance from gaging point to upper reference line, $\pm 0.03$ mm RR	Distance from gaging point to lower reference line, $\pm 0.03$ mm SS
1.....	mm 50	mm 14.5	mm 25	mm 12.5	mm 11.5
1½.....	50	14.5	25	12.5	11.5
2.....	50	14.5	25	12.5	11.5
3.....	56	16.2	28	14.0	12.9
4.....	56	16.2	28	14.0	12.9

7.3.1 *Plug gage.*—The central circumferential reference line shall be the gaging point.

A short axial reference line shall intersect each of the circumferential reference lines. The axial line intersecting the central circumferential reference line shall be on the opposite side of the plug from the other two axial lines. All three axial lines shall be in the same plane running through the axis ( $180^\circ \pm 0.5^\circ$ ) to check the location of the bore holes.

7.3.2 *Ring gage.*—The width of the milled recesses, or windows, measured parallel with the axis shall be approximately one-fourth of the length of the ring, and the width of the opening at the inner surface of ring, measured perpendicular to axis, shall not exceed one-fourth of the length of the ring. The recesses shall be so placed that the reference lines fall approximately midway in the recesses.

7.3.3 *Fit of product in working gages.*—The product (both inner and outer members) shall fit the corresponding working gages so that the centerlines through the openings corresponds with the reference lines on the gage within 0.3 mm for 1,  $1\frac{1}{2}$ , and 2 mm bores, and 0.5 mm for 3 and 4 mm bores.

#### 8. REQUIREMENTS FOR T-BORE AND $120^\circ$ BORE STOPCOCKS

8.1 These stopcocks are designated by the nominal bore size. With the exception of the bore sizes, the dimensions and tolerances for 1,  $1\frac{1}{2}$ , and 2 mm T-bore and  $120^\circ$  bore stopcocks are the same as for the 4 mm single straight-bore stopcocks. Dimensions and tolerances for 3 and 4 mm T-bore and  $120^\circ$  bore stopcocks are the same as for the 6 mm single-bore stopcocks. (See table 4.)

8.2 TAPER.—All T-bore and  $120^\circ$  bore stopcocks shall have a taper of  $1 \pm 0.006$  mm of diameter per centimeter of length (1 to 10).

##### 8.3 MASTER GAGES.

8.3.1 *Plug gage.*—The 4 mm single straight-bore gage shall be used for 1,  $1\frac{1}{2}$ , and 2 mm T-bore and  $120^\circ$  bore, and 6 mm single straight-bore gage for 3 and 4 mm T-bore and  $120^\circ$  bore stopcocks.

8.3.2 *Ring gage.*—To check diameter at the centerline of the bore, the 4 mm single straight-bore ring gage shall be used for the 1,  $1\frac{1}{2}$ , and 2 mm sizes; and the 6 mm single straight-bore ring gage for the 3 and 4 mm sizes of T-bore and  $120^\circ$  bore stopcocks.

8.3.3 *Ring gage for locating position of bores for T-bore and  $120^\circ$  bore.*—The length of the ring gage shall be 25 mm  $\pm 1.0$  mm for all sizes. The outside diameter of the rings shall be approximately twice the diameter at the centerline of the

bore. The inside diameter at the large end of the tapered portion shall be equal to the diameter at the centerline of the bore of the plug (product)  $\pm 0.1$  mm. Four reference lines approximately 0.1 mm wide shall be provided on the upper face of the gage at right angles to the vertical axis. Two lines shall be  $180^\circ \pm 0.5^\circ$  apart, and the other two lines shall be  $90^\circ \pm 0.5^\circ$  and  $120^\circ \pm 0.5^\circ$  from one of the first two lines.

## 9. REQUIREMENTS FOR TAPER-GROUND FLASK STOPPERS

9.1 The designations and dimensions for taper-ground flask stoppers are given in figure 13 and table 13.

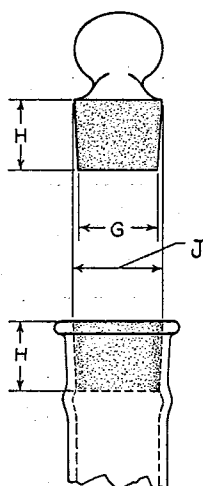


Figure 13.—Flask stopper.

Table 13.—Flask stoppers

Stopper number	Approximate diameter at small end G	Length of ground zone H	Computed diameter at large end of ground zone (gaging point) J
	mm	mm	mm
8.....	7.25	$10.0 \pm 1.0$	8.25
9.....	8.00	$14.0 \pm 1.0$	9.40
13.....	12.00	$14.0 \pm 1.0$	13.40
16.....	15.00	$15.0 \pm 1.0$	16.50
19.....	18.00	$17.0 \pm 1.0$	19.70
22.....	20.00	$20.5 \pm 1.5$	22.05
27.....	25.00	$21.5 \pm 1.5$	27.15
32.....	30.00	$21.5 \pm 1.5$	32.15
38.....	35.00	$30.0 \pm 2.0$	38.00

9.2 TAPER.—All taper-ground flask stoppers shall have a taper of  $1 \pm 0.006$  mm of diameter per centimeter of length (1 to 10).

9.3 MASTER GAGES.—Dimensions and tolerances for master gages are shown in figures 14 and 15 and tables 14 and 15. The overall diameter of the ring gage shall be approximately twice the diameter of the small end of the bore, but not less than 25 mm.

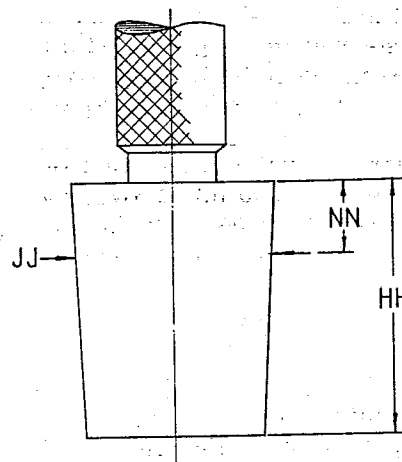


Figure 14.—Master plug gage for flask stopper.

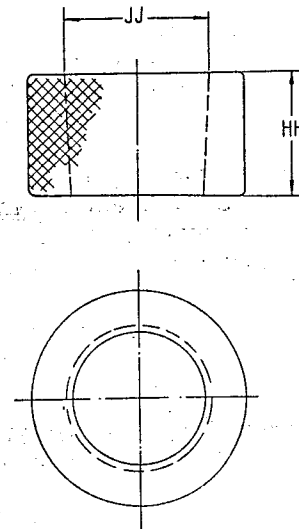


Figure 15.—Master ring gage for flask stopper.

Table 14.—Master plug gages for flask stoppers

Stopper number	Length of tapered portion, +2.0 mm, -0 mm HH	Diameter at gaging point, $\pm 0.003$ mm JJ	Distance from top of tapered portion to gaging point NN
	mm	mm	mm
8.....	23	8.25	10
9.....	27	9.40	10
13.....	27	13.40	10
16.....	28	16.50	10
19.....	30	19.70	10
22.....	34	22.05	10
27.....	35	27.15	10
32.....	35	32.15	10
38.....	44	38.00	10

Table 15.—Master ring gages for flask stoppers

Stopper number	Length of ring, $\pm 0.1$ mm	Inside diameter at large end of taper, $\pm 0.003$ mm	Stopper number	Length of ring, $\pm 0.1$ mm	Inside diameter at large end of taper, $\pm 0.003$ mm
	mm	mm		mm	mm
8.....	11	8.25	22.....	22	22.05
9.....	15	9.40	27.....	23	27.15
13.....	15	13.40	32.....	23	32.15
16.....	16	16.50	38.....	32	38.00
19.....	18	19.70			

9.3.1 *Fit of product in working gages.*—The large end of stopper shall come flush with large end of ring gage within  $\pm 0.5$  mm along the axis for stoppers Nos. 8 to 19, inclusive; and within  $\pm 1.0$  mm along the axis for stoppers Nos. 22 to 38, inclusive.

9.3.2 Plug gage shall enter flask so that gaging point on plug shall be at least 0.5 mm and not over 1.5 mm above extreme top surface of flask for stoppers Nos. 8 to 19, inclusive; and at least 1.0 mm and not over 3.0 mm for stoppers Nos. 22 to 38, inclusive.

#### 10. REQUIREMENTS FOR TAPER-GROUND BOTTLE STOPPERS

10.1 The designations and dimensions of taper-ground reagent bottle stoppers are shown in figure 16 and table 16.

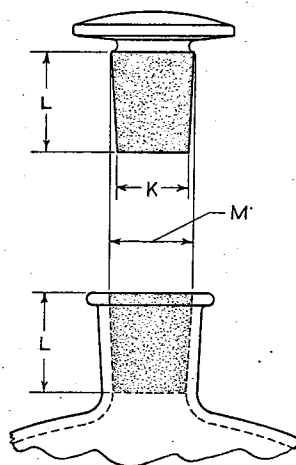


Figure 16.--Reagent bottle stopper.

Table 16.--Reagent bottle stoppers

Stopper number	Approximate diameter at small end K	Length of ground zone L	Computed diameter at large end (gaging point) M
	mm	mm	mm
14.....	12.5	20 $\pm 1.5$	14.5
19.....	16.6	22 $\pm 1.5$	18.8
24.....	21.0	30 $\pm 2.0$	24.0
29.....	25.7	35 $\pm 2.0$	29.2
34.....	30.5	40 $\pm 2.0$	34.5
45.....	40.3	47 $\pm 2.0$	45.0

10.2 TAPER.--All taper-ground reagent bottle stoppers shall have a taper of  $1 \pm 0.006$  mm of diameter per centimeter of length.

10.3 MASTER GAGES.--Dimensions and tolerances for master gages are shown in figures 17 and 18, and tables 17 and 18. The overall diameter of the ring gage shall be approximately twice the diameter of the small end of the bore, but not less than 25 mm.

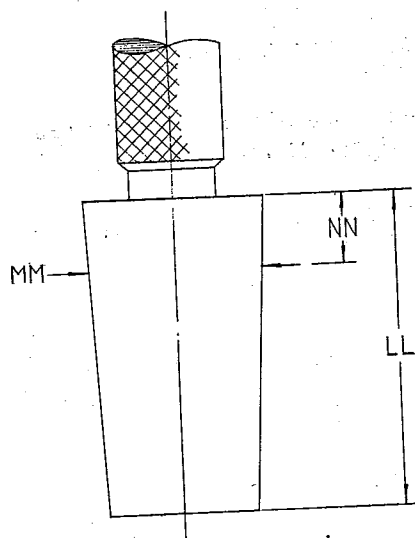


Figure 17.--Master plug gage for reagent bottle stopper.

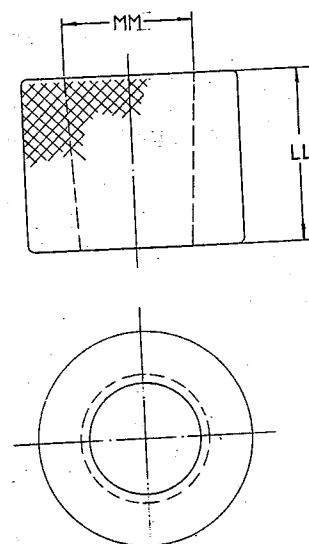


Figure 18.--Master ring gage for reagent bottle stopper.

Table 17.--Master plug gages for reagent bottle stoppers

Stopper number	Length of tapered portion, $+2.0$ mm, $-0$ mm LL	Diameter at gaging point, $\pm 0.003$ mm MM	Distance from top of tapered portion to gaging point NN
	mm	mm	mm
14.....	32.5	14.5	10
19.....	35.5	18.8	10
24.....	44.0	24.0	10
29.....	49.0	29.2	10
34.....	54.0	34.5	10
45.....	61.0	45.0	10



Table 18.--Master ring gages for reagent bottle stoppers

Stopper number	Length of ring, $\pm 0.1$ mm LL	Inside diameter at large end of taper, $\pm 0.003$ mm MM
	mm	mm
14.....	21.5	14.5
19.....	23.5	18.8
24.....	32.0	24.0
29.....	37.0	29.2
34.....	42.0	34.5
45.....	49.0	45.0

10.3.1 *Fit of product in working gages.*--The large end of stopper shall come flush with large end of ring gage within  $\pm 0.5$  mm along the axis for stoppers Nos. 14 and 19, and within  $\pm 1.0$  mm along the axis for stoppers Nos. 24 to 45, inclusive.

10.3.2 Plug gage shall enter bottle so that gaging point on plug shall be at least 0.5 mm and not over 1.5 mm above extreme top surface of bottle for stoppers Nos. 14 and 19; and at least 1.0 mm and not over 3.0 mm for stoppers Nos. 24 to 45, inclusive.

#### 11. REQUIREMENTS FOR INTERCHANGEABLE SPHERICAL-GROUND JOINTS

11.1 SOCKET MEMBER.--The design of the socket member is shown in figure 19. The contour of the ground area shall be spherical, with a radius of curvature equal to one-half of the gaging ball diameter specified in table 19 as a minimum. The contour of the shoulder shall be essentially spherical and concentric with the ground area. When tested in accordance with paragraph 11.6.2, socket members shall show a continuous circumferential line of contact with the gaging ball.

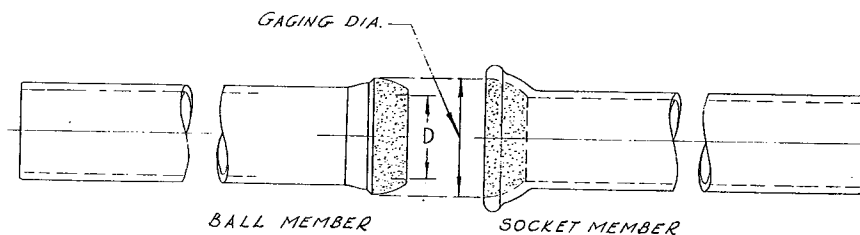


Figure 19.--Diagram of ball and socket members.

11.2 BALL MEMBER.--The design of the ball member is shown in figure 19. The contour of the ground area shall be spherical, with a radius of curvature equal to one-half of the gaging ball diameter as specified in table 19 as a maximum. The contour of the shoulder shall be essentially spherical, approximately concentric with the ground area and with a slightly smaller radius to provide a short offset at or slightly beyond the line of the gaging diameter. Ball members shall meet the reduced pressure test (par. 11.6.3) when assembled with a socket member complying with paragraph 11.1.

Table 19.--Spherical-ground joints

Joint size designation	Nominal gaging diameter	Dimension D (approximate)	Gaging ball diameter
	<i>mm</i>	<i>mm</i>	<i>Inches</i>
7/1.....	7	1.0	0.28125, $\pm 0.00005$
12/1.....	12	1.0	0.50000, $\pm 0.00010$
12/1.5.....	12	1.5	0.50000, $\pm 0.00010$
12/2.....	12	2.0	0.50000, $\pm 0.00010$
12/3.....	12	3.0	0.50000, $\pm 0.00010$
12/5.....	12	5.0	0.50000, $\pm 0.00010$
18/7.....	18	7.0	0.75000, $\pm 0.00010$
18/9.....	18	9.0	0.75000, $\pm 0.00010$
28/12.....	28	12.0	1.12500, $\pm 0.00015$
28/15.....	28	15.0	1.12500, $\pm 0.00015$
35/20.....	35	20.0	1.37500, $\pm 0.00015$
35/25.....	35	25.0	1.37500, $\pm 0.00015$
40/25.....	40	25.0	1.62500, $\pm 0.00015$
50/30.....	50	30.0	2.00000, $\pm 0.00015$
65/40.....	65	40.0	2.50000, $\pm 0.00020$
75/50.....	75	50.0	3.00000, $\pm 0.00025$
102/75.....	102	75.0	4.00000, $\pm 0.00030$

11.3 SIZE DESIGNATION.--The size designation of joints shall be the nominal gaging diameter, and the inside diameter of the joint at the end of the ball member, both expressed in millimeters and separated by a line. Therefore, the designation 18/7 means that the nominal gaging diameter of the joint is 18 mm, and the inside diameter of the joint is 7 mm.

11.4 DIMENSIONS.--The size designations and essential dimensions of joints are shown in table 19. Only the sizes listed shall be considered standard.

11.5 INTERCHANGEABILITY.--When assembled ball and socket members are paired at random and tested under reduced pressure, the manometer reading shall not drop at a rate greater than specified in paragraph 11.7.3.

## 11.6 METHODS OF TEST.

11.6.1 *Gaging ball.*—Gaging balls shall have dimensions and tolerances shown in table 19.

11.6.2 *Gaging the socket.*—Sockets shall be tested against a gaging ball. The ball shall enter the socket and the line of contact shall be continuous circumferentially. This line may be obtained with the use of a film of Prussian blue or stopcock grease applied to the gaging ball.

11.6.3 *Test under reduced pressure (so-called vacuum test).*—Paired ball and socket members selected at random shall meet the following test when assembled dry (without lubrication). The ball and socket members must be scrupulously clean and dry. Dip each member into a solvent such as carbon tetrachloride or benzene and allow the surfaces to dry in air without wiping. If any particles such as fibers are apparent on the ground surfaces they should be removed with a camel's-hair brush. The test apparatus is illustrated schematically in figure 20.

Connect the socket member to the apparatus by means of a rubber stopper and glass tubing and/or heavy rubber tubing. Close the end of the ball member by means of another rubber stopper. Seat the two members when resting in a horizontal position without excessive pressure by a slight turning action which should not exceed  $45^\circ$  of arc. The joint should be held during test without clamp or pressure except the atmospheric pressure. The test shall be conducted at a pressure of between 720 mm and 740 mm of mercury.

Members of a joint tested shall be considered acceptable if, after the manifold is closed to the source of vacuum, the manometer reading drops not more than 7 mm in 60 seconds when a joint 12 mm or smaller is being tested, and not more than 15 mm in 60 seconds when a joint 18 mm or larger is being tested.

In questionable cases or for confirmation of true spherical construction of the joint, members shall be tested not only assembled in a straight line as above but also misaligned approximately  $15^\circ$ .

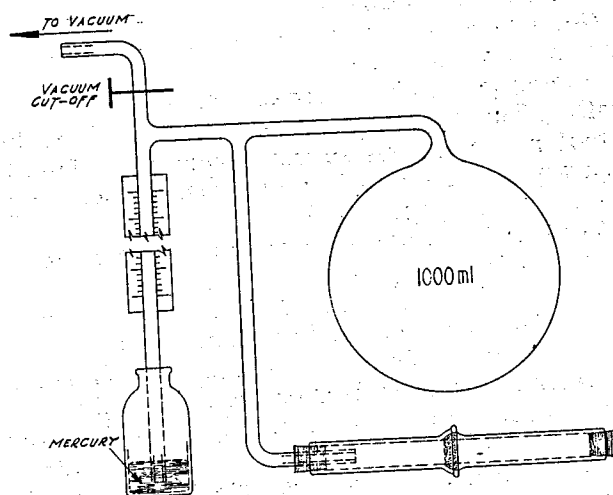


Figure 20.--Schematic representation of reduced-pressure test apparatus.

## 12. MARKING

12.1 Interchangeable taper-ground joints, stopcocks, and stoppers conforming to this Commercial Standard shall be marked on both members with symbol A, indicating standard taper, the size designation, and the trade-mark of the manufacturer or distributor. This symbol is the manufacturer's assurance to purchasers that the item identified by the symbol is a standard interchangeable size and type described in this pamphlet, and is manufactured within the tolerances permitted by this Commercial Standard. It shall not be used on joints, stopcocks, or stoppers, nor in advertising descriptions of joints, stopcocks, or stoppers of any size or type other than those described in this standard.



Symbol A.

12.2 Interchangeable spherical-ground joints conforming to this Commercial Standard shall be marked on both members with this symbol B indicating spherical joint, the size designation, and the trade-mark of manufacturer or distributor. This symbol is the manufacturer's assurance to purchasers that the item identified by the symbol is a standard interchangeable size and type described in this pamphlet, and is manufactured within the tolerances permitted by this Commercial Standard. It shall not be used on joints nor in advertising description of joints of any size or type other than those described in this standard.



Symbol B.

### 13. EFFECTIVE DATE

13.1 Having met all procedural requirements of the Commodity Standards Division, including approval by the acceptors hereinafter listed, this Commercial Standard is issued by the U. S. Department of Commerce, effective July 1, 1958.

EDWIN W. ELY,

Chief, Commodity Standards Division.

### HISTORY OF PROJECT

FIRST EDITION.--Pursuant to a request from manufacturers and distributors of laboratory glassware, a general conference of manufacturers, distributors, and users of interchangeable ground-glass joints was held on December 17, 1929, at the National Bureau of Standards, Washington, D. C. The purpose of this conference was to consider the establishment of commercial standard tapers and diameters on the basis of a preliminary draft submitted by a committee of manufacturers and dealers. After making minor adjustments, the conference unanimously adopted the proposed standard and recommended it for acceptance by the industry. After acceptance had been formally given, the standard was promulgated and issued in printed form as Commercial Standard CS21-30, effective August 1, 1930.

SECOND EDITION.--The Standing Committee, as a result of conferences on May 25 and July 20, 1933, recommended the extension of the Commercial Standard to include 3, 9, and 65 mm sizes of interchangeable ground-glass joints; 5 sizes of interchangeable straight-bore, ground-glass stopcocks; 8 sizes of interchangeable ground-glass flask stoppers; and 6 sizes of interchangeable ground-glass reagent bottle stoppers. The proposed revision was circulated to the industry on January 5, 1934, for written acceptance, with the result that the revised standard was accepted and authorized by the industry for publication as Commercial Standard CS21-34, effective September 1, 1934.

THIRD EDITION.--In response to a demand for additional sizes and lengths of grindings, the Standing Committee met on February 11, 1936, and adopted a second revision, which was circulated to the industry for acceptance on March 18, 1936. Success of the revision was announced May 15, 1936, and it was published as CS21-36, effective from that date.

FOURTH EDITION.--On November 2, 1938, the Standing Committee adopted the third revision to provide a series of short-length joints for use primarily on weighing bottles with interchangeable covers. This revision was circulated to the

industry for acceptance on December 9, 1938. Success of the revision was announced February 1, 1939, and it was published as CS21-39, effective February 15, 1939.

FIFTH EDITION.—On May 1, 1957, upon recommendation of the Standing Committee, a recommended revision of CS21-39 was circulated to the industry for acceptance. It had been developed by a series of meetings of the committee during 1955 and 1956, and through supplementary correspondence. The scope of the standard was expanded to include specifications for single and double oblique-bore stopcocks and spherical-ground joints.

On October 25, 1957, the Commodity Standards Division announced that acceptances of this revision had been received from a satisfactory majority of the industry and that Commercial Standard, CS21-58, entitled, "Interchangeable Taper-Ground Joints, Stopcocks, Stoppers, and Spherical-Ground Joints," would become effective July 1, 1958.

Project Manager: F. W. Reynolds, Commodity Standards Division, Office of Technical Services.

Technical Advisors: I. H. Fullmer, Engineering Metrology Section; Shuford Schuhmann, Chemistry Division; Leonardo Testa, chief glass-blower, National Bureau of Standards.

#### STANDING COMMITTEE

The following individuals comprise the membership of the standing committee, which is to review, prior to circulation for acceptance, revisions proposed to keep the standard abreast of progress. Comments concerning the standard and suggestions for revision may be addressed to any member of the committee or to the Commodity Standards Division, Office of Technical Services, U. S. Department of Commerce, which acts as secretary for the committee.

Dr. H. K. Alber, Arthur H. Thomas Co., Vine and Third Sts., P. O. Box 779, Philadelphia, Pa. (Chairman.)

W. E. Barr, Gulf Research & Development Co., P. O. Drawer 2038, Pittsburgh, Pa.

E. E. Behm, Fisher Scientific Co., Greenwich and Morton Sts., New York, N. Y.

C. M. DeWoody, Ace Glass, Inc., Vineland, N. J.

William Geyer, Scientific Glass Apparatus Co., 100 Lakewood Terrace, Bloomfield, N. J.

Elmer L. Jolley, Corning Glass Works, Corning, N. Y.

W. C. Kontes, Kontes Glass Co., Vineland, N. J.

Dr. M. R. Lytton, American Viscose Corp., Marcus Hook, Pa.

James J. Moran, Kimble Glass Co., Vineland, N. J.

Dr. William Mosher, University of Delaware, Newark, Del.

Shuford Schuhmann, National Bureau of Standards, Washington, D. C.

Leonardo Testa, National Bureau of Standards, Washington, D. C.

## ACCEPTANCE OF COMMERCIAL STANDARD

If an acceptance has not previously been filed, this sheet properly filled in, signed, and returned will provide for the recording of your organization as an acceptor of this Commercial Standard.

**WITHDRAWN**

Commodity Standards Division  
Office of Technical Services  
U. S. Department of Commerce  
Washington 25, D. C.

Gentlemen:

We believe that Commercial Standard CS21-58 constitutes a useful standard of practice, and we individually plan to utilize it as far as practicable in the

production<sup>1</sup> distribution<sup>1</sup> purchase<sup>1</sup> use<sup>1</sup>

of interchangeable taper-ground joints, stopcocks, stoppers, and spherical-ground joints. We reserve the right to depart from it as we deem advisable.

We understand, of course, that only those products which actually comply with the standard in all respects can be identified or labeled as conforming thereto.

Signature of authorized officer \_\_\_\_\_

(In ink)

(Kindly typewrite or print the following lines)

Name and title of above officer \_\_\_\_\_

Organization \_\_\_\_\_

(Fill in exactly as it should be listed)

Street address \_\_\_\_\_

City, zone, and State \_\_\_\_\_

<sup>1</sup> Underscore the one that applies. Please see that separate acceptances are filed for all subsidiary companies and affiliates which should be listed separately as acceptors. In the case of related interests, trade associations, trade papers, etc., desiring to record their general support, the words "General support" should be added after the signature.

## TO THE ACCEPTOR

The following statements answer the usual questions arising in connection with the acceptance and its significance:

1. *Enforcement.*—Commercial Standards are commodity specifications voluntarily established by mutual consent of those concerned. They present a common basis of understanding between the producer, distributor, and consumer and should not be confused with any plan of governmental regulation or control. The United States Department of Commerce has no regulatory power in the enforcement of their provisions, but since they represent the will of the interested groups as a whole, their provisions through usage soon become established as trade customs, and are made effective through incorporation into sales contracts by means of labels, invoices, and the like.

2. *The acceptor's responsibility.*—The purpose of Commercial Standards is to establish, for specific commodities, nationally recognized grades or consumer criteria, and the benefits therefrom will be measurable in direct proportion to their general recognition and actual use. Instances will occur when it may be necessary to deviate from the standard and the signing of an acceptance does not preclude such departures; however; such signature indicates an intention to follow the standard, where practicable, in the production, distribution, or consumption of the article in question.

3. *The Department's responsibility.*—The major function performed by the Department of Commerce in the voluntary establishment of Commercial Standards on a nationwide basis is fourfold: first, to act as an unbiased coordinator to bring all interested parties together for the mutually satisfactory adjustment of trade standards; second, to supply such assistance and advice as past experience with similar programs may suggest; third, to canvass and record the extent of acceptance and adherence to the standard on the part of producers, distributors, and users; and fourth, after acceptance, to publish and promulgate the standard for the information and guidance of buyers and sellers of the commodity.

4. *Announcement and promulgation.*—When the standard has been endorsed by a satisfactory majority of production or consumption in the absence of active valid opposition, the success of the project is announced. If, however, in the opinion of the standing committee or of the Department of Commerce, the support of any standard is inadequate, the right is reserved to withhold promulgation and publication.



## ACCEPTORS

The organizations listed below have individually accepted this standard for use as far as practicable in the production, distribution, testing, and purchase of interchangeable taper-ground joints, stopcocks, stoppers, and spherical-ground joints. In accepting this standard, they reserved the right to depart from it as they individually deem advisable. It is expected that articles which actually comply with the requirements of this standard in all respects will be regularly identified or labeled as conforming thereto, and that purchasers will require such specific evidence of conformity.

### ASSOCIATIONS

#### (General Support)

American Scientific Glassblowers Society,  
Philadelphia, Pa.  
Combed Yarn Spinners Association, Gastonia,  
N. C.

### FIRMS AND OTHER INTERESTS

Ace Glass, Inc., Vineland, N. J.  
Alabama, University of, School of Chemistry,  
University, Ala.  
American Agricultural Chemical Co., Carter-  
et, N. J.  
American Cyanamid Co., Charlotte, N. C.  
American Viscose Corp., Research & De-  
velopment Division, Marcus Hook, Pa.  
Ansco (Division of General Aniline & Film  
Corp.), Binghamton, N. Y.  
Berge, J. & H., New York, N. Y.  
Bowser-Morner Testing Laboratories, Inc.,  
Dayton, Ohio.  
Central Scientific Co., Chicago, Ill.  
Chicago Apparatus Co., Chicago, Ill.  
Colorado School of Mines, Golden, Colo.  
Corning Glass Works, Corning, N. Y.  
Creighton University, Omaha, Nebr.  
Daigger, A., & Co., Chicago, Ill.  
Dayton, University of, Dayton, Ohio.  
Delaware, University of, Newark, Del.  
Detroit Testing Laboratory, Inc., Detroit,  
Mich.  
Dolbey, Edward P., & Co., Inc., Philadelphia,  
Pa.  
Dow Chemical Co., Midland, Mich.  
du Pont de Nemours, E. I., & Co., Inc.,  
Charleston, W. Va.  
Fisher Scientific Co., New York, N. Y.  
Fisher Scientific Co., Pittsburgh, Pa.  
Florida, University of, Gainesville, Fla.  
Georgia, University of, Athens, Ga.  
Greiner, Otto R., Co., Newark, N. J.  
Gulf Research & Development Co., Pitts-  
burgh, Pa.  
Hercules Powder Co., Research Center, Wil-  
mington, Del.  
Howe & French, Inc., Boston, Mass.  
Hunt, Robert W., Chicago, Ill.  
Indiana University, Bloomington, Ind.

Kansas, University of, Lawrence, Kans.  
Kimble Glass Co. (Subsidiary of Owens-Illi-  
nois), Toledo, Ohio.  
Kntes Glass Co., Inc., Vineland, N. J.

Leeds & Northrup Co., Philadelphia, Pa.  
Lurex Manufacturing Co., Vineland, N. J.

Mallinckrodt Chemical Works, St. Louis, Mo.  
Manhattan College, New York, N. Y.  
Maryland, University of, College Park, Md.  
Massachusetts, University of, Amherst, Mass.  
Mercer Glass Works, Inc., New York, N. Y.  
Merrell, William S., Co., Cincinnati, Ohio.  
Milwaukee Glass Works, Inc., Milwaukee,  
Wis.

Nester, L. G., Co., Inc., Millville, N. J.  
New York Sugar Trade Laboratory, New York,  
N. Y.

New York Testing Laboratories, Inc., New  
York, N. Y.

North Dakota State College, School of Chemical  
Technology, Fargo, N. Dak.

Oklahoma, University of, Norman, Okla.  
Orange Memorial Hospital, Orange, N. J.  
Orthmann Laboratories, Inc., Milwaukee, Wis.

Patzig Testing Laboratories, Des Moines,  
Iowa.

Pennsylvania, University of, Harrison Labora-  
tory of Chemistry, Philadelphia, Pa.

Precision Thermometer & Instrument Co.,  
Philadelphia, Pa.

Purdue University, Department of Biochem-  
istry, Lafayette, Ind.

Purdue University, Department of Chemistry,  
Lafayette, Ind.

Rice Institute, Houston, Tex.

Sargent, E. H., & Co., Chicago, Ill.  
Scientific Glass Apparatus Co., Inc., Bloom-  
field, N. J.

Scientific Supplies Co., Seattle, Wash.  
Shell Development Co., Emeryville, Calif.  
Stoilenmaier, H., Co., Caldwell, N. J.  
South Dakota State College, Brookings, S. Dak.

Tennessee, University of, Knoxville, Tenn.  
Thomas, Arthur H., Co., Philadelphia, Pa.  
Trinity College, Hartford, Conn.

Universal Oil Products Co., Research & De-  
velopment Laboratories, Des Plaines, Ill.

West Virginia University, Morgantown,  
W. Va.  
Wheaton, T. C., Co., Millville, N. J.  
Williams, A. W., Inspection Co., Inc., Mobile,  
Ala.  
Wrigley, William Jr., Co., Research Depart-  
ment, Chicago, Ill.

#### U. S. GOVERNMENT

Air Force, Department of, Wright Air De-  
velopment Center, Wright-Patterson Air  
Force Base, Ohio.  
Navy, Department of, Military Medical Supply  
Agency, Brooklyn, N. Y.

#### OTHER COMMERCIAL STANDARDS

A list of Commercial Standards may be obtained from the Commodity Standards Division, Office of Technical Services, United States Department of Commerce, Washington 25, D. C. This list includes the purchase price of the publication and directions for ordering copies.